DOCUMENT RESUME

ED 407 755 EC 305 312

AUTHOR	Werts, Margaret Gessler; And Others
TITLE	Instructive Feedback: Increasing Opportunities for Learning through the Addition of Incidental Information.
INSTITUTION	Allegheny-Singer Research Inst., Pittsburgh, PA.
SPONS AGENCY	Office of Special Education and Rehabilitative Services (ED), Washington, DC.
PUB DATE	91
NOTE	51p.; Appendix O of "Learning Efficiently: Acquisition of Related, Non-Target Behaviors (Project LEARN). Final Report"; see EC 305 304.
CONTRACT	H023C00125
PUB TYPE	Guides - Non-Classroom (055) -- Reports - Descriptive (141) -- Reports - Research (143)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Educational Strategies; Efficiency; Elementary Secondary Education; *Feedback; Grade 6; Inservice Teacher Education; *Instructional Effectiveness; Learning Processes; *Mild Disabilities; Preschool Education; Reinforcement; Student Behavior; Teacher Education; *Teacher Response; Teaching Guides; Teaching Methods

ABSTRACT

Designed to be used by practicing teachers, students who are learning to become teachers, and faculty members who instruct such students, this manual describes an instructional manipulation for teaching children with mild disabilities that increases opportunities for learning through the addition of extra information. The technique described uses teacher feedback to students' responses to supply students with additional information. The manual includes: (a) background and description of instructive feedback; (b) description of the nine steps involved in planning and using instructive feedback; (c) two case studies describing the use of instructive feedback in a sixth grade class and in a preschool class; (d) summary statements of the research on which the manual is based; and (e) a self-test to allow readers to determine whether they have acquired the content in the manual. An appendix includes a list of the studies that used instructive feedback. Charts listing the decisions to be made prior to implementing the technique, describing direct teaching strategies, and listing target behavior and related extra information are also included. (Contains 35 references.) (CR)

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Instructive Feedback:

Increasing Opportunities for Learning

Through the Addition of Incidental Information

Margaret Gessler Werts

Mark Wolery

Ariane Holcombe

1991

Learning Efficiently: Acquisition of Related Non-Target Behaviors

(Project LEARN)

Early Childhood Intervention Program
Department of Psychiatry
Allegheny-Singer Research Institute
320 E. North Avenue
Pittsburgh, PA 15212

EC 305 312

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Purpose of the Manual

This manual is designed to be used by practicing teachers, students who are learning to become teachers, and faculty members who instruct such students. Our intent is to disseminate information from our research to as many individuals as possible; therefore, we give permission for users to reproduce the document and to use it, in whole or in part, in the training and research activities. We request that any reproductions maintain the authorship of the manual, and that it contain an acknowledgement and disclaimer that the manual was developed by U.S. Department of Education, Grant Number HO23C00125.

Description of the Manual

This manual contains several sections: (a) background and description of instructive feedback, (b) description of the steps involved in planning and using instructive feedback, (c) two case studies describing the use of instructive feedback, (d) summary statements of the research on which the manual is based, (e) a self-test to allow readers to determine whether they have acquired the content in the manual, (f) references for the literature that is cited, and (g) a list of the studies that used instructive feedback.

Acknowledgements

Development of the manual was supported by the U.S. Department of Education, Office of Special Education and Rehabilitative Services, Grant Number HO23C00125. However, the opinions expressed do not necessarily reflect the policy of the U.S. Department of Education, and no official endorsement by the U.S. Department of Education should be inferred. We are grateful for the assistance provided by Phillip S. Strain, Lucy A. Fleming, and Martha L. Venn of the Early Childhood Intervention Program, Allegheny-Singer Research Institute. We also are grateful for the assistance provided over the years by Melinda Jones Ault, Belva C. Collins, Patricia Munson Doyle, David L. Gast, John W. Schuster, and Vincent Winterling. Finally, we are particularly grateful to the teachers who assisted us in conducting this research, the children who participated, and the families who allowed their children to participate.

Instructive Feedback

Increasing Opportunities for Learning Through the Addition of Incidental Information

Project LEARN ASRI-ECIP

"Two for One!" "Second item at reduced price!"

These words mean opportunities for bargains and most of us are delighted to find a bargain. As teachers, would you be interested in teaching one thing and having your students learn "two for one"? Think about how much more you could teach in one year! Think about the time you could save for other activities, other curriculum areas, and enrichment activities!

Quick and efficient!

This manual describes an instructional manipulation that will allow you to teach particular skills, selected from your current curriculum, and get other skills at a "reduced price." It describes how to use a procedure that increases opportunities for learning through the addition of extra information in your instructional exchanges with students. The procedure is easy to implement, relatively quick to deliver, and, in short, is an efficient way to teach additional information. This procedure involves presenting this extra information in the events that follow student responding. It is called "instructive feedback."

Simply stated, the teacher presents a task for the student to learn, and then, after a response, the teacher delivers praise and adds information that is related to the answer. For example, Mrs.

Piper wants John to learn to read vocabulary words from the basal reader. She uses a direct instruction procedure and reinforces him with verbal praise after each correct trial. A trial would sound like this:

Mrs. P.: "John, look. What's this word?"
John: "Lute."
Mrs. P.: "Good."

With instructive feedback (extra learning in the consequence - after the trial), Mrs. Piper modifies her response only slightly:

Mrs. P.: "John, look. What's this word?"
John: "Lute."
Mrs. P.: "Good. It's a stringed instrument."

Therefore, with some planning, but minimal investment of instructional time, the teacher has taught two concepts, sight word reading and definitions, rather than one. John is not expected to respond to the definition, nor is he reinforced for learning the definition but a growing body of literature shows that students of many ages can learn extra information if teachers consistently plan for and add that information after the learning trial.

Why Should We Be Efficient?

More efficient teaching allows students to learn more in the same amount of time or an equal amount in less time, thus freeing time to learn additional skills, spend more time interacting with peers, or refining other skills. Efficient instructional strategies also are those that require less staff instructional time, require less preparation time and less material development, and those that are easier to implement. The rapid learning that students achieve with more efficient strategies often leads to greater teacher satisfaction and more positive interactions between teacher and students (Wolery & Gast, 1990). Instructive feedback meets many of these standards.

What is the Basis for Instructive Feedback?

Instructive feedback is based on three separate but related sources: (a) basic research on incidental learning, (b) research related to using positive reinforcement, and (c) applied research on instructive feedback. **INCIDENTAL LEARNING** refers to students acquiring information that is present in the instructional context but for which there are no programmed contingencies for the learner to acquire that information (Stevenson, 1972). For example, students may be taught a given skill such as how to fry an egg; while learning to do this they learn that the yoke of the egg is yellow and that the clear fluid around the yoke turns white when it is cooked. The teacher is only purposefully teaching the student to fry eggs, and the student learns to do that but also learns other things. Instructive feedback is designed to ensure that children learn those additional things that are related to but are not central to the primary task being taught.

Research on the use of reinforcement has produced many important findings that are incorporated into classrooms throughout the nation. First, this research has shown that the effective use of reinforcement will increase positive behaviors in children and will result in more rapid learning. Second, this research has shown that when delivering reinforcement in the form of praise, the praise should label the behavior being reinforced. For example, we know that praising students by saying "Good, you are reading your book." is better than simply saying "Good." The former tells the student what is "good" about their behavior.

It is extra learning.

Recently, a number of studies have attempted to answer the question, "Can we add extra information into instructional trials and will students learn that extra information?" This research indicates that extra information can be inserted in two places in an instructional trial:

(a) Extra information can be presented immediately prior to an instructional trial (antecedent event); or

(b) Extra information can be presented immediately following a student's response (consequent event).

The purpose of this manual is to describe the second arrangement - the addition of extra information in the praise or feedback events for students. This is called "instructive feedback" because the feedback instructs the student to learn additional information. A companion manual, titled: Increasing Opportunities for Learning through the Addition of Extra Information: Antecedent Events deals with the former.

Research on Incidental Learning and Instructive Feedback

Psychological research studies on incidental learning generally expose the learner to some form of interaction with or attention to the stimuli, and then test for retention. The subjects are not told that they will be tested for recall or recognition, nor they are told to manipulate or focus on one dimension of the stimulus, and that they will be tested on another dimension (Elliot & Carroll, 1982; Stevenson, 1972). Many of the studies test the immediate recall of a word or the information studied. The consensus of the studies is that, although intentional learning is greater than incidental learning, the subjects do recall some of the extra information. As educators and teachers, we are interested in facilitating more than the immediate recall. There is a body of research, using direct instructional models, that goes another step and adds related extra material to an instructional session. One difference between these studies and the psychological literature is that we want the students to learn both the target and extra information, but we reward them for responding to the target information only. Sometimes we test for recall of the extra information after students have acquired the target material and sometimes we test for it during the instructional process.

Is it really incidental?

There is some question about whether information presented in instructive feedback is really incidental learning. In the strict sense it probably is not. Incidental learning studies are designed to understand what students learn when they are not aware that they are "supposed" to learn that information. In instructive feedback studies, the goal is somewhat different. These studies are designed to understand how to allow students to learn more information than they would

learn in usual instruction. In these studies, students often are assessed for learning the extra information and then are taught and tested again. This repeated testing may cause students to be aware that they should learn the extra information, and if this occurs, then it is not true incidental learning. However, since the goal is to increase the amount of learning, the fact that it is not true incidental learning is less important.

No responses are required.

A fair question, however, is, how is instructive feedback different from direct instruction? At least two differences exist. First, the student does not respond directly to the extra information that is presented in the instructive feedback. In direct instruction, students respond directly to the stimuli being taught. Second, no reinforcement is provided for learning the extra information that is presented in the instructive feedback.

Negligible extra time.

In direct instruction, reinforcement is usually provided for correct responding. The advantages of instructive feedback are that it takes negligible extra time during instruction, and it often leads to extra learning. It should be noted, however, that the research on instructive feedback has always occurred in the context of the direct instruction. That is, students are being taught some skills directly and information about those skills are added to the feedback students receive for learning those directly taught skills.

Section II

Teaching model for increasing learning through extra information in the consequent event

In the literature, direct instructional techniques with the addition of extra information has been used with students of all ages from preschool (age 3-6) to adults. Students with a wide range of handicapping conditions have learned

effectively and efficiently with these techniques. Of 87 students taught in 18 studies using direct instruction with extra instructive feedback, only 4 have not reached the criterion set by the instructor for the target behavior and only 4 have not learned some of the extra information. Although this indicates that there are a few for whom the technique is not optimal, most students do benefit from it.

As in any teaching situation, the instructor must make several decisions before beginning to teach. These decisions include what should be taught, when it should be taught, the format (e.g., individual or small group instruction, etc.), and what instructional methods to use to teach it. The factors that influence these decisions and guidelines for making these decisions are beyond the scope of this text. However, several sources exist; for determining what to teach, see Browder (1987), Bailey and Wolery (1989), Snell (1987), Berdine and Meyer (1987), and Taylor (1989). For determining when and how instruction should be implemented, consult Bailey and Wolery (in press); Collins, Gast, Ault, and Wolery (1991); Mercer and Mercer (1989); Snell (1987); Wolery, Ault, and Doyle (in press); Wolery, Bailey, and Sugai (1988). For selecting instructional strategies, see Wolery, Ault, and Doyle (in press) and Wolery, Doyle, Alig, Ault, Gast, and Morris (1988).

For direct instructional techniques with instructive feedback, the teacher must decide on methods for monitoring, when and how the extra information should be delivered, how many pieces of information should be presented, what types of information and what curricula areas may be covered in both target and incidental behaviors. These decisions are summarized in Table 1 and discussed in the following paragraphs.

Table 1

Decisions to be Made Prior to Implementing the Technique

Decision	Example
1. Identify the behaviors the student needs to learn, select a direct instructional technique, and select the time and the format for teaching.	Three students need instruction reading basal reader vocabulary. Constant time delay procedures have been effective for these students in the past; therefore it will be used and instruction will be provided in a small group format.
2. Select the extra information.	These students would benefit from knowing the definitions of these words as well as how to read them.
3. Determine how the target stimuli will be presented. a. What mode of presentation? b. How much or how many?	The teacher chooses to present the words on flash cards. The teacher selects nine words for each student to be taught 3 words at a time to each student. She also selects a criterion of 2 sessions at 100% correct responding.
4. Determine how and when the extra material will be presented. a. What mode of presentation? b. How much or how many?	The definitions are given verbally following correct responses and praise. One definition will be stated each time the child reads a word correctly.
5. Determine how the students are expected to respond to the target material.	The students read the vocabulary words orally.
6. Even though students are not reinforced for learning extra information, determine what responses are expected or allowed.	The students are expected to listen to the definitions but they will not be discouraged from repeating them aloud.
7. Determine how learning of the target behaviors will be monitored.	The teacher will collect data during instruction and daily graphs of percentages of correct responding will be constructed.
8. Determine how extra information will be monitored.	Probes at the conclusion of training will determine the amount of extra information that has been learned.
9. Decide how to adjust instruction if students do not learn.	Evaluations of student performance will be used to make modifications in instruction.

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The nine steps, presented in Table 1, are described more fully in the following section. We have included a discussion of some of the research that impacts on each decision so that you may make informed decisions about your students. A summary of the research studies dealing with incidental learning in the consequent event is given in the last section of this manual.

Step 1 ***Identify the behaviors that the student needs to learn, select an instructional technique, and select a time and format for teaching.***

Teachers should select material that is developmentally appropriate, that students need to function more competently in the current and future environments, and that is consistent with the student's IEP goals or the curriculum standards of their school district. Ideally, the materials should be interesting and motivating to the child.

Tasks that we teach to students can be broken down into two categories. These are discrete tasks and chained tasks. Discrete tasks, those that require a relatively short answer (one word to a sentence), are particularly appropriate for instructive feedback. These include some language arts material such as sight words, definitions, and spelling, math questions (multiplication facts, coin combinations, shape names), social studies (facts about service agencies), and preacademic skills (colors, letter naming, and numeral recognition). Chained tasks are those that involve a number of responses that are joined together to form a complex skill. These include making a bed, setting a table, and working a long division problem. Chained tasks are outside the realm of this manual because instructive feedback has not been systematically studied and shown to be an efficient technique with the multi-stepped tasks, although it may work with chained tasks as well as discrete ones.

Careful assessment of prerequisite skills prior to instruction can ensure that the techniques and materials are appropriate and therefore that students will learn. In general terms, students must have adequate sensory systems and

developmental levels for the methods and materials selected. In addition, they must be able to comply with the requirements of the techniques, (e.g., waiting for the prompt in time delay procedures, discriminating among prompts for SLP, able to clearly indicate a response, etc.)

A number of different instructional strategies can be used in direct instruction (Wolery, Ault, & Doyle, in press; Wolery, Bailey, & Sugai, 1988); examples of these with a short description are shown in Table 2. In fact, a large research base exists for many of those strategies. A couple important findings about these strategies deserve mention. First, many of them can be used with students of different ages. Second, many of them can be used for a number of different types of skills. Third, most of them require careful student monitoring to ensure that students are learning effectively. Thus, in making selections among these strategies, you must be aware of how they are implemented and how they can be adjusted when students do not readily learn.

Table 2

Description of Direct Teaching Strategies

Error Correction - The teacher provides the target stimulus (discriminative stimulus) and presents an opportunity for the child to respond. Correct responses are differentially reinforced, and errors result in a prompt.

Antecedent Prompt and Test - The teacher presents a prompt simultaneously with the target stimulus before the learner responds, presents an opportunity to respond, and reinforces correct responses. In subsequent trials, the prompt is removed and a "test" is given to determine if the behavior occurs when presented with the target stimulus alone. During test trials, error responses may or may not receive a prompt.

Antecedent Prompt and Fade - The teacher presents a prompt simultaneously with the target stimulus, presents an opportunity to respond, and reinforces correct responses. Over trials, the prompt is systematically faded until the learner responds to the target stimulus alone. Fading may occur on the dimensions of frequency and intensity.

Simultaneous Prompting - The teacher provides a prompt simultaneously with the target stimulus, presents an opportunity to respond, and reinforces correct responses. In daily probe trials, the target stimulus is presented alone.

Most-to-Least Prompting (Decreasing Assistance) - The teacher uses a hierarchy of prompts ordered from most to least intrusive. Initially the most intrusive prompt is presented simultaneously with the target stimulus, and correct responses are reinforced. This continues until the child attains a specified criterion level of performance. When criterion is reached with the most intrusive prompt, the next less intrusive prompt is provided until performance meets criterion. This process continues until the child responds to the target stimulus alone.

System of Least Prompts (Increasing Assistance) - The teacher uses a hierarchy of prompts ordered from least to most intrusive. On each trial, the teacher presents the target stimulus alone, and provides an opportunity for a response. If no response or an error results, the least intrusive prompt is presented as is an opportunity to respond. Again, if no response is forthcoming or an error occurs, the next most intrusive prompt is presented with an opportunity to respond. This continues until the child responds correctly. Reinforcement is provided, and the trial is terminated when the child responds correctly to any level of the hierarchy.

Table Continues

Table 2: Description of Direct Teaching Strategies (continued)

Constant Time Delay - The teacher initially presents the target stimulus simultaneously with a controlling prompt followed by an opportunity to respond for a specified number of trials. Correct responses are reinforced. For subsequent trials, the interval between the delivery of the target stimulus and presentation of the prompt is increased for a fixed number of seconds. Correct responses before and after the prompt are usually reinforced.

Progressive Time Delay - The teacher initially presents the target stimulus simultaneously with a controlling prompt followed by an opportunity to respond for a specified number of trials. Correct responses are reinforced. For subsequent trials, the interval between the delivery of the target stimulus and presentation of the prompt is gradually increased. Correct responses before and after the prompt are usually reinforced.

Graduated Guidance - The teacher begins each trial with the type and amount of prompt necessary, and as the child begins to perform the task the prompts are removed immediately. If the child stops or begins to perform incorrectly, the type and amount of prompts needed are immediately applied and withdrawn as appropriate. Reinforcement is provided if the child completes even a minimal amount of the task correctly; reinforcement is not provided if the child resists at the end of the task.

Incidental Teaching - The teacher arranges the environment to cause the child to initiate. When the child initiates, the teacher asks for an elaboration of the child's language and provides a response interval. If the elaboration is forthcoming, the teacher responds according to the child's initiation (e.g., supplies permission or information). If the elaboration is not forthcoming, the teacher provides a prompt and another response interval and provides consequences as described here.

Mand-Model Procedure - The teacher observes the child and notes his/her focus of attention. When the focus of attention is determined, the teacher provides a mand (non yes/no question) and provides a short response interval. If the child responds correctly, the teacher praises the child and terminates the interaction. If the child does not respond correctly, the teacher provides a model, a response interval, and consequences as appropriate.

Source: Bailey, D. B., & Wolery, M. (in press). Teaching infants and preschoolers with disabilities. Columbus, OH: MacMillan.

In addition to the instructional strategy, you must consider the instructional format. Many students with handicaps are taught in one to one situations but this may not be the most effective method. Group instruction may be effective in freeing instructional time, facilitating social interactions and in providing opportunities to learn from other students. Collins, Gast, Ault, and Wolery (1991) list several decisions that are important to consider when designing small group instruction for students. The size of the group is determined, in part, by the students' experience with group settings, the presence of appropriate group skills, the type of task to be taught, and session length. Heterogenous or homogeneous groupings can be used. The students may be taught the same tasks or they may all be learning different tasks, giving them an opportunity to learn from observation of other students' tasks. Student characteristics, classroom configurations and the nature of the material to be taught will help determine the format chosen.

The time for instruction is another variable to be planned. Many of the studies conducted one session per day with the time selected dependent on the classroom schedule. Others worked in two a day, typically one in the morning and one in the afternoon. One study (Wolery, Werts, Holcombe, Billings, & Vassilaros, 1991) taught dispersed trials throughout the day during transitions from one activity to another. Your situation will determine what will provide the greatest opportunities for learning for each of your students.

TASK 1:

Identify for your situation, a student or students to whom you want to teach target and extra information. As you read through the manual, continue to use these students as you work through the steps for implementing this model.

a. Student(s) _____

_____

b. Target skill: _____

c. Instructional strategy: _____

_____

d. Number of students to be taught: _____

e. Time of day for instruction: _____

_____

f. Number of sessions per day/week: _____

_____

Step 2 *Select the extra information to be presented.*

Not surprisingly, the selection of the extra material should be undertaken with as much care as the selection of the target behaviors. Primarily, the extra material has been related in some way to the targeted behaviors (i.e., sight words and their spellings, vocabulary words and their definitions, photos and labels or words, coins and their values, etc.).

Spelling and definitions were taught to augment sight words (Gast, Wolery, Morris, Doyle, & Meyer, 1990; Gast, Ault, Wolery, Doyle, & Baklarz, 1990). Modelling and signing have been taught to augment receptive identification of objects and pictures (Gast, Doyle, Wolery, Ault & Farmer, 1991). Additional facts were added to one base of facts that were targeted (Wolery, Alig-Cybriwsky, Gast, & Boyle-Gast, 1991; Doyle, Gast, Wolery, Ault, & Farmer, 1990). In some cases, the incidental material has been an extension of the target. Werts, Wolery, Holcombe, Vassilaros, and Billings (1991) taught shape names and added the color name of the shape. Harrell, Wolery, Ault, Demers, and Smith (1991) taught antonyms and used the sight word and the definition of the opposite as the incidental. Edwards (1989) taught students to spell abbreviations and then tested to see if they could spell the whole word used as a stimulus. These studies required that the students relate the target stimuli to the incidental.

However, other variables also must be considered. Of course, the material must be developmentally appropriate. In one study, (Wolery, Werts, Holcombe, Billings, & Vassilaros, 1991), students were taught two pieces of information following instruction on recognizing an array of pennies. They were shown the numeral that corresponded to the value of the array and the written number word in two presentation formats. One 4-year-old student learned the numerals that corresponded to the values of the pennies but only half of the written number words. It was postulated that the "easier" task, that of reading numerals, was appropriate, whereas, reading number words was not yet appropriate for her. Wise (1990) taught complex multi-syllable words to adolescents and added definitions as the consequence. The students learned the words rapidly but showed a low rate of learning the definitions. Again, the author concluded that the wording of the definitions were difficult and that the students may not have known what the definitions meant. Gast, Wolery, Morris, Doyle, and Meyer (1990) found learning of extra behavior presented in instructive feedback to be at a low rate and noted, "low percentages of correct responding ... may relate to the difficulty of the target task." (p. 20)

Interest level may also be a factor. Some material is more interesting to some students than to others. For example, science facts may be of great interest or of no interest at all. Motivation may also play a part. This, in many cases, may be taken care of by the manipulations of the reinforcement schedules, but the concerned professional will look to the involvement level of the students as the teaching is progressing.

The following table lists information, both target and extra, that has been taught in research studies using instructive feedback. In addition, below the dotted line, there is a listing of skills that may be considered for use with this technique. Other skills can be added to the list as you consider your students and their needs.

Table 3

Target Behavior and Related Extra Information

Target	Extra Information
Sight words	Definitions
Sight words	Spelling
Sight words	Manual signs/pictures
Recipe words	Demonstration of the action
	Use of the object
Spelling abbreviations	Spelling the referent word
Social studies facts	Related facts
Rebus symbols	Classification of the objects
Shapes	Colors
Antonyms	Sight words/definitions
Coins	Number words/equal values of pennies
	numerals
Numerals	Number words
Labels for photos	Sight words for the labels
.....	.....
Addition facts	Answer plus one more
Adding fractions	Decimal or percentage equivalents
Geometric shapes	Degrees in the angles
Foreign language vocabulary	Definitions/spelling
Foreign language vocabulary	Use in a sentence
Grammatical construct	Examples of nouns, verbs, etc.
Spelling	Rules of spelling
Battles of the Civil War	Generals, locations, victors, etc.
First lines of poems	Authors
_____	_____
_____	_____
_____	_____
_____	_____

TASK 2:

Select the extra skills or materials to augment the target concepts you will teach to your students. _____

_____

_____

_____

Step 3 Determine how the target stimuli will be presented.

This decision must be based on the characteristics of the skills, the technique used, and the learner. For the discrete tasks that are addressed in this manual, material has been presented verbally, signed manually, printed on flash cards, flashed on a computer screen, and depicted in photographs or line drawings. Thus, a variety of means for presenting target stimuli have been evaluated.

In direct instructional techniques, the instructor must also decide how the trials are to be distributed throughout the day. They may be presented in a massed-trial format, in a spaced trial format, and in distributed trials throughout the day (Mulligan, Guess, Holvoet, & Brown, 1980). Massed trials refers to the presentation of trials so that other behaviors do not occur between them. Repeated drill with flash cards would be a massed trial format. Spaced trials require a pause or a rest period (e.g., 15 seconds) between each trial. Distributed trials occur throughout a time period (sometimes as much as the whole school day) and have other related or non-related tasks presented in between the trials (e.g., transition-based teaching).

Another critical decision is how many items should be taught at one session. In the literature, up to 5 items have been taught per condition. Younger children have typically been given fewer items, with two being the most common number taught. Doyle, Wolery, Ault, Gast, Wiley

(1989) compared teaching two behaviors concurrently to teaching one behavior at a time. They found that students learned to discriminate between two items more efficiently if two were presented at once. They concluded that the students learned to look at salient variables of the stimuli allowing the discrimination between the two concurrent stimuli to be rapidly learned.

The number of trials per session for the entire group depends on the number of items you have chosen to teach each student, the number of students in the group, the age and functioning levels of the students. Since students respond to each trial, the session length will increase as the number of trials increases. In the literature, the number of trials in a session varies from 1 at a time for transition based teaching (Werts et al., 1991) to 64 (4 students learning 4 facts each with 4 repetitions of each fact) (Wolery, Cybriwski, Gast, & Boyle-Gast, 1991). Typically, the students saw each stimulus 2 to 4 times in a session, with the stimuli being shown no more than twice in a row. For groups of students, the stimuli can be presented in a predictable manner or an unpredictable manner. If the teacher always presents stimuli from left to right, students may be able to predict when their turns will come. A randomized manner (e.g. no more than two turns for any student, no consistent order of calling on students, etc.), may facilitate attention from students (Collins et al. 1991).

TASK 3:

Identify how the target material is to be presented.

a. What mode of presentation? _____

_____

b. How are the tasks to be distributed? __

_____

c. How many stimuli are to be taught? ___

d. How many times will you present each stimuli? _____

Step 4 Determine how and when the extra material will be presented.

The incidental material has been shown on flash cards with no verbal cues or reinforcement. It has been shown on flash cards with verbal reading of the card by the teacher. One study showed the word that the student was learning to read and the teacher recited each letter of the word aloud. Information has been signed as well as said. Words have been shown on a computer screen and spoken by a speech synthesizer. In one study, the students were allowed to imitate the modeled action of an object if they desired. However, most of the extra information has been presented verbally. Obviously, decisions regarding method of presentation must consider student characteristics as well as characteristics of the stimuli. Student's acuities and sensory abilities are critical. For example manual signing or total communication may be most appropriate with students who have hearing impairments. Students with visual impairments may need tactile stimuli or cards with large bold type. Material and information also dictate some decisions regarding presentation. Identification of colors require a visual presentation. Identification of coins may be visual or possibly tactile. Facts, word recognition, or numbers could be presented verbally or with a combination of modalities. These decisions need to be considered carefully for each situation.

Several studies have presented the information on every trial where the student responded correctly. Others have interspersed the incidental trials with those looking at other variables. Although we cannot directly compare the amount of learning, it is instructive to see that incidental information does not seem to interfere with learning target material. Janssen and Guess (1978) found that modelling the function of an object after correct pointing to the correct object allowed severely retarded individuals to acquire labeling skills faster than the training alone.

Several studies have extended the addition of information to look at the amount of material that may be added. Wolery, Werts, Holcombe, Billings, and Vassilaros (1991) added two types of information for each target behavior: one condition

information for each target behavior: one condition added two types simultaneously (two pieces of information on one flash card after every trial) and one condition added two types but presented each one every other trial. There was no substantial difference in the amount of information learned between the two presentation methods. One student in that study learned all of "easier" information and very little of "harder" task. Harrell et al. (1991) directly taught antonyms and added the sight word and a definition as the consequent event. The students learned to read the words at high percentages (over 80% correct responding) and 3 of the 7 students also learned to respond correctly with the definitions of the words (two of them at 100% correct responding). The number or amount of extra information learned may be a function of the difficulty of the material instead of whether one or two pieces are presented. The research literature does not indicate whether more than two pieces or types of extra information can be learned.

The method of presentation includes more than the number of items presented per trial. Extra information has been inserted into praise statements, and in both praise and correction statements. Systematic comparison of the two techniques has not been conducted but in looking at the research it would appear that a greater number of errors occur with the addition of information in both praise and correction statements. The students do get greater exposure to the material but it has not been shown that this leads to greater learning. Keel and Gast (in press) used feedback in both praise and correction statements but their students evidenced near errorless learning so few opportunities for presenting extra information after errors occurred. Wolery, Werts, Holcombe, Billings, and Vassilaros (1991) and Werts, Wolery, Holcombe, Vassilaros, and Billings (1991) provided extra information for correct and error responses in feedback events. The error rates were higher, and although not directly comparable, the learning rates for extra information were lower than other studies. This may have been due to many other procedural modifications and the characteristics and ages of the learners but it is a variable worth considering.

It improves with age.

One interesting by-product of the research is that students seem to become more efficient with increased experience with the technique. It has been noted, but never systematically investigated, that the number of trials to criterion decrease in successive tiers and the number of errors tend to decrease. Wise (1990) taught four students to state definitions to supplement sight words. After the first tier of training, only one student responded to the incidental probes correctly. On the second and third tiers, all four students responded correctly to some of the definitions (between 20 and 60 percent). The overall responding was low (mean was 18.3% but this was depressed due to the non-responding in the first tier.) The technique seems to "improve with age." It is as yet unclear just when, if ever, this phenomenon levels out.

TASK 4:

Determine how and when the extra material is to be presented.

a. What mode of presentation is appropriate?

_____

b. How often is the information to be added?

_____

c. How many pieces of information are you adding to each trial?_____

_____

d. Are you adding the extra information after correct responses only or after correct and incorrect responses?_____

_____

Step 5 *Determine how the students are expected to respond to the target material.*

The response of the student must be clear enough to be judged as correct or incorrect so that a reinforcer can be delivered. Obviously, the modes of communication of the students must be taken into account. The child who is non-verbal may be asked to point, sign, indicate a response on a communication board or a computer. Language appropriate to the student's abilities should be accepted.

TASK 5:
Identify the appropriate response to the target material.

_____

_____

_____

Step 6 *Although the students are not reinforced for learning extra information, determine what responses are expected or allowed.*

Basically, in the research, the students have not been required to make any response to the extra information during instruction, nor have they been rewarded for responding to it. Sometimes the students do respond. In the study by Wolery, Werts, Holcombe, Billings, and Vassilaros (1991), the students were shown a card with information on it after they responded with a number answer. A word and pennies were on the card and the investigator said, "And that's (five), too.' The students frequently imitated, "and that's (five), too." It is unclear how it may have affected the learning of the extra information. In this study, the students modelled the information correctly. There is a question then as to what should have

been done if they had not been correct. Incorrect responding might have been extinguished with further trials or the students might have benefitted from a correction model.

TASK 6:

Decide how to react (or not react) to spontaneous responses to incidental information:

a. ignore

b. correct if responded to incorrectly

Step 7 Determine how learning of the target behaviors will be monitored.

Step 8 Determine how extra information will be monitored.

Monitoring is a basic component of the high quality instruction. It is helpful to know when the students have learned the material. A number of different data collection systems exist for monitoring learning (Wolery, Ault, & Doyle, in press; Wolery, Bailey, & Sugai, 1988). The method used may vary depending on the instructional strategy used.

What is not clear is whether the monitoring system chosen and the amount of monitoring assists in boosting learning of the incidental material. Wolery, Fleming, Venn, Domjancic, and Thornton (1991) used a direct instructional strategy in a group and found that students who were not monitored learned less of the target material than those who were probed daily to assess learning rates. Later, the students who had not been in daily probe sessions initially were placed in further group training and probed daily and their acquisition of skills reached the criterion level very quickly.

Most direct instruction techniques include methods for monitoring. Probing to determine the

levels of incidental learning that is occurring can be implemented on a daily basis or after students achieve criterion on target skills. Some instructional strategies include daily monitoring to determine when to move to the next level of prompts, or to the next level of information, etc. Some techniques, such as simultaneous prompting or transition-based teaching, may require a separate session to measure daily progress. You will need to examine the techniques you have selected to determine whether the data collection methods give enough information or whether you need to add daily probes.

TASKS 7 and 8

Identify the monitoring techniques used by the strategy you have selected._____

_____

_____

Identify the monitoring techniques that you will use to assess the amount of extra learning that is taking place.

Are daily probes needed as well? _____

_____

If so, what form do they need to take? _____

_____

_____

Step 9 Decide how to adjust instruction if students do not learn.

We know that monitoring acquisition rates allows us to systematically evaluate how the instruction is proceeding and to modify procedures to allow students to learn more effectively. These instructional techniques are not static and when a student is having difficulty with a task, several modifications have proven helpful. Sometimes a

very simple change in reinforcers or the reinforcement schedule will produce greater achievement. Although we carefully assess what is reinforcing for each student before we begin direct instruction, the strength of reinforcers change with the passage of time and use. Using a more frequent schedule of reinforcement or changing to a primary reinforcer may accelerate learning. Generally, in the time delay literature, students have been rewarded for both correct responses before and after the prompt. This generally leads to near errorless learning. Some students, however, will develop a strategy of waiting for the prompt to receive the reward without learning to answer correctly. This can be "cured" by rewarding only correct answers before the prompt (differential reinforcement). It is not desirable to implement this technique from the start because the error percentage may be higher and the learning rates are slower but it is a modification that is needed with some students.

Attending cues speed learning. Specific attending cues have been added when the instructor sees errors or patterns of learning that indicate that the student is not focusing on relevant variables of the stimuli. In trials involving learning to read sight words, students have been asked to listen to the spelling of the words, to match words, to recite each letter aloud, or to write the word. Each acted as a cue to pay attention to all the letters of the word. Other methods of ensuring maximal attention to the target stimuli have included matching the stimuli to a sample--usually a two to four choice format, touching or tracing the stimulus, and repeating the question either individually or chorally during group instruction.

TASK 9:

Be prepared to evaluate each student as the training progresses for patterns of learning that indicate a need for a modification.

SECTION III

The Model in Practice

The following examples will illustrate the process of devising instruction using instructive feedback and the decision model outlined above.

Small group

Mrs. Lee taught in an integrated sixth grade classroom in a public school. She had several students who needed to "catch up" with the class in addition of fractions. On a unit test following the chapter, four students scored less than 50% and analysis of errors indicated that they did not understand that they were to add the numerators for fractions with like denominators. Jeff, Sean, Michelle, and Stephanie were familiar with time delay procedures. Since constant time delay has been shown to be somewhat more efficient than progressive time delay and because it is easier to implement, Mrs. Lee decided to teach addition of fractions with like denominators using a group constant time delay procedure. To simplify the procedure, she taught the same fraction combinations to each member of the group. She prepared flash cards with the problems written on them, choosing 3 target problems for the first set. Each student would be asked to respond twice to each problem, giving a session of 24 trials (3 problems x 2 presentation to each student x 4 students). Each session would typically take 7 or 8 minutes.

Choose the extra material.

The rest of the class had learned percentage equivalents for some fractions as well, and each of these students showed some weaknesses in this area. Mrs. Lee chose to make her procedure more efficient by adding percentage equivalents as a consequence. There is a one to one correspondence to fractions and the corresponding percentage and so Mrs. Lee further decided to add only one piece of

information as incidental information. She would present it both verbally and visually with the percentages written on the back of the flash cards she had prepared for the problems. She would present the incidental information only after correct responding by the students to keep the error rates as low as possible. The students would not be expected to respond to the information and Mrs. Lee anticipated that it would add only a few seconds to each trial.

The training sessions followed the procedures for constant time delay. For each correct answer, Mrs. Lee added the incidental information. For example, she would say, "Good...and this is equal to 3/4." At this point she would show the back of the flash card that had "75%" written on it.

Monitoring is important.

Monitoring was ongoing while the sessions were taking place. Mrs. Lee taught the sessions immediately after she presented a math lesson when her classroom routine called for her students to start independent math practice. She recorded the number of times each student correctly waited for the prompt and the number of correct answers given before the prompt. Graphs were kept of each student's performance. Michelle, Jeff, and Sean learned to respond correctly to the problems that Mrs. Lee presented. Stephanie consistently added both the denominators and the numerators of the fractions. Mrs. Lee instituted an attentional cue for her. She presented the stimulus card to Stephanie and said, "Touch the numerators." When Stephanie had done so, she continued with the trial by asking her to respond with the correct answer to the problem. Stephanie began giving correct anticipations before the controlling prompts.

The group's criterion level of responding was set at three days at 100% correct responding. When all four students reached this level, Mrs. Lee tested them again on the skill of adding fractions. Michelle and Sean were able to transfer the training they had received to other behaviors. Stephanie and Jeff were able to add some fractions they had been trained on, but made some mistakes when they added then in a pencil and paper format. Mrs. Lee prepared another set of problems for further training for Stephanie and Jeff. She also tested the acquisition of percentage equivalents for all four students and found that their overall responding to the trained equivalents was at 85%,

roughly the same as the rest of the class.

Mrs. Lee could have made other choices about her procedures which may have made the procedure even more efficient. She could have taught different problems to each student so that they had the benefit of learning from hearing the other students' answers. She could have added two pieces of information after each correct answer. For example, she might have written each card to read "75% = .75" and taught percentages and decimals. Individual sessions or having individuals exit the group as they reach criterion may have been more efficient for some students.

Transition-Based Teaching

Minimal time investment.

Other instructional techniques can be augmented with incidental information to make instruction more efficient. Karen taught a class of nine preschoolers identified as speech and language impaired and or hearing impaired. She wanted to teach color names to the children. Observation and diagnostic teaching showed her that the children could not all name the basic shapes and that there were shapes that none of the children could name. Since she wanted to maximize the efficiency of her teaching and add this dimension to an already full curriculum, she decided to use transition-based teaching with a constant time delay. Since there were two dimensions of the behaviors she wished to teach, she further decided to use incidental learning to add the names of the shapes to the color trials. To make the procedure consistent, she chose to add the incidental information to both the praise and the correction statements rather than adding it to praise statements and ignoring errors.

Karen tested each child in the class to find a baseline for the ability to expressively name the colors that she wanted them to learn. Seven of the students could not name any of them. Christopher named purple consistently and Megan sometimes named purple and blue correctly but she sometimes confused them. Karen then tested to see if each student could name the shapes and she identified 6 shapes that none of the students could identify but that she wanted them to know. The next step in the assessment was to ensure that the children had the

visual acuity to attend to flash cards, and that they could match each target color and shape to a sample seen in a three choice format. This ensured that they could visually discriminate between the shapes and colors well enough to learn the different names. Karen also tested to assure herself that they were verbally or manually dexterous enough to indicate the names of the colors and shapes.

She chose 6 colors and 6 shapes to be taught and prepared white 5x8 index cards with a colored shape on each card. She also prepared cards with black ink line drawings of the shapes on them. and cards that were colored to match each of the colored shapes.

On the first day of training, Karen followed the classroom's usual routine until circle time was over. The procedures in the class called for her to direct each child individually to an activity area. She called each child by name but instead of immediately sending them to the table, she held one card and asked, "What color is this?" Following the procedure for 0-second trials for CTD, she immediately said, "It's purple." The student modelled, "It's purple." Karen added, "and its a triangle." Then she called the next student. Jason listened while she asked, "What color is this" and he did not respond but turned toward the activity table. She directed his attention to the card again and said, "Jason, what color is this? Its purple." Jason responded with "Purple." Karen added the incidental information and Jason was allowed to proceed to the table. The procedure was repeated with each student. The whole procedure was repeated with the second stimulus during the next transition, from the activity areas to the snack table. The two stimuli were taught three times each that day. Each trial took approximately 5 seconds per child, adding less than a minute to each transition.

Daily probes may help.

The following day, Karen expanded the delay between the question and the controlling prompt from 0 seconds to 3 seconds. She also started daily probes to determine individual learning. Although she had decided on a group criterion for changing target stimuli, she wanted individual data for IEP information. The probes took approximately 45 seconds per child. She gave each child 4 trials per probe (two per stimuli) once a day.. These were

conducted during nap time, following activities, and while waiting for the bus to arrive.

Karen's students learned the first two color names within seven days of training which Karen calculated as approximately 30 minutes of her class time. They were responding to colors of objects in the classroom with approximately at 75% rate of success and were improving daily. The incidental learning of shape names was at a lower rate but Karen felt that it was good to have her students respond correctly, at least half the time, on information that they had not been directly taught and that they did not know at all a few days earlier. She knew that she could bolster this skill at a later time.

To summarize, we can increase opportunities for learning by adding incidental information to the targeted information. By inserting incidental material into the feedback statement following each learning trial, extra information is learned "for free." The student is not required to respond to this extra material and is not rewarded for doing so. The addition is "quick and painless," and makes our teaching more efficient.

The decision making questions are presented again so that you may plan instructional sessions for your student(s) that include incidental learning. Using the notes you made in the Task sections, plot the target and incidental information you would like to teach to your students. List the information as it will appear on the cards, or on the computer screen, or that you will say to the students during training. Then list the incidental information that you will use and plan it according to the steps you have learned.

Decisions to be Made Prior to Implementing the Technique

Student(s): _____

1. Identify the behaviors the the student needs to learn, select a direct instructional technique, and select the time and the format for teaching.
2. Select the extra information.
3. Determine how the target stimuli will be presented. a. What mode of presentation? b. How much or how many?
4. Determine how and when the extra material will be presented. a. What mode of presentation? b. How much or how many?
5. Determine how the students are expected to respond to the target material.
6. Even though students are not reinforced for learning extra information, determine what responses are expected and allowed.
7. Determine how learning of the target behaviors will be monitored.
8. Determine how extra information will be monitored.
9. Decide how to adjust instruction if students do not learn.

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SECTION IV

Research

This section reviews the relevant research studies that were identified for this technique. They are presented here for reference and so that you may compare the variables that influence your situation with those used in research studies. A complete reference list is supplied in the appendix. The studies are summarized in Table 4.

Eighteen studies were identified that used direct instructional techniques and added incidental information in the consequent event. Seven of these taught sight words either selected from the curriculum materials such as from a basal reader, or selected from the environment of the students. Four of the seven teaching sight words added definitions as the "extra" material (Stinson et al., 1989; Gast, Wolery, Morris, Doyle, & Meyer, 1990; Shelton, Gast, Wolery & Winterling, 1991; Wise, 1990), one added a picture of the action word learned or modelled the action (Gast, Doyle, Wolery, Ault & Farmer, 1991), one added manual signs for the word (Carper, 1990), and one added the spelling of the stimulus word (Gast, Doyle, Wolery, Ault, & Baklarz, 1991a). One study used a computer to teach spelling of abbreviations and added the spelling of the whole word (Edwards, 1989). Two studies taught facts about service agencies and added additional facts as the incidental material (Doyle, Gast, Wolery, Ault & Farmer, 1990; Wolery, Cybriwski, Gast, & Boyle-Gast, 1991). One taught students to recognize rebus symbols and tested to see if they learned to classify the referent objects (Wolery, Holcombe, Werts, & Cipollone, 1991). Three studies added more than one piece of additional information (Harrell, Wolery, Ault, Demers, & Smith, 1991; Gast, Doyle, Wolery, Ault, & Baklarz, 1991b; Wolery, Werts, Holcombe, Billings, & Vassilaros, 1991). One study used transition based trials (Werts, Wolery, Holcombe, Vassilaros, & Billings, 1991). One used simultaneous prompting and added

information and then tested to see if toddlers could use the information to classify foods. Two studies expanded the concept of incidental learning to see if exposure to incidental information enhances future learning (Wolery, Doyle, Ault, Gast, Meyer, & Stinson, 1991; Holcombe, Wolery, Werts, & Hrenkevich, 1991.).

Both group and individual instruction was deemed effective. A variety of instructional strategies were used as well. The procedure was used with constant time delay, progressive time delay, simultaneous prompting, transition based teaching, trial and error testing, and computer aided instruction.

The percentage of incidental material learned ranged from 18.3% to 93%. There seemed to be no definitive pattern for the low scores except that it may relate to the difficulty of the material for the students involved. Several authors alluded to this fact. Others mentioned that the stimulus may not have been attended to (Edwards, 1989).

In an early study, Janssen and Guess (1978) taught four adolescent residents of a state institution to label objects and compared a labeling only condition with a labeling and receiving information about the objects function and being allowed to manipulate the object as a consequence to a correct response. Results indicated that the students acquired labeling skills faster with the function added to the training than by the label only method.

Stinson, Gast, Wolery, and Collins (1991) taught sight word reading using progressive time delay with group instruction for four elementary aged students with moderate mental retardation. Definitions were inserted into praise statements following correct identification of the words. The overall means for acquisition of definitions were 78% for target words and 61% for words of the other student in the dyad.

Wise (1990) investigated the use of constant time delay procedures in a group instructional format with four adolescents diagnosed with mild delays. The students were taught complex, multi-syllable vocabulary words and the definitions were inserted in the praise statements. Students responding increased from 0% to 18.3%. The low

rate of acquisition of definitions was perhaps due to the rapid rate of learning of the vocabulary words, and to the difficulty of the words in the definitions.

Gast, Wolery, Morris, Doyle and Meyer (1990) taught five elementary aged students with moderate retardation to read environmental sight words and the definitions of the words were inserted into praise statements. All students learned some of the incidental information for both target words and words taught to other group members. Some students learned considerably more than others but the overall mean was 37.8% (range 11.1% to 83.3%).

Carper (1990) used a progressive time delay procedure to teach sight word reading and picture identification to five high school students with moderate to severe retardation. Although all students did not learn all the behaviors to the criterion level, three students completed the training, and one student learned one pair of words. Overall, the five students learned 39.1% of the incidental information (signs and expressive identification of pictures) that was inserted into the praise statements.

Shelton, Gast, Wolery, and Winterling (1991) taught eight students (elementary aged, mild handicaps) to read functional sight words. The authors inserted spelling into the antecedent event and definitions into the consequent event. They also used group instruction and allowed some students to be observers only in some groups. Performance in incidental learning was variable across students but all students learned some incidental information. Percentage of correct responding across students and conditions on definitions was between 25 and 100 percent (mean = 70%) and for spelling it was between 0 and 100 percent (mean = 46%).

Gast, Doyle, Wolery, Ault, and Baklarz (1991a) studied the acquisition of spelling competence when learning to read words. They taught the subjects, four primary aged students with mild mental handicaps, to recognize sight words. The teacher modelled the correct spelling either before or after the student's reading response. They found that the incidence of correct spelling increased more with the antecedent model for the short term but that in the posttest condition, the spelling

was greater for words that had been modelled in the consequent event. They theorize that for long term retention, the consequent incidental teaching was the most effective.

Doyle, Gast, Wolery, Ault, and Farmer (1990) compared the amount of learning when students were taught two target and six observational social studies and health facts and when all students were taught the same eight facts. Incidental information was added to all conditions. Students learned slightly fewer facts (mean=15) when taught two targets and 6 observational than when taught all eight facts directly (mean=16) but the technique using observational learning was more efficient in terms of number of sessions and amount of time for instruction. Students acquired incidental facts with slightly higher levels for the target facts but with an overall level of about 75%.

Gast, Doyle, Wolery, Ault, Farmer (1991) compared progressive time delay and the system of least prompts for effectiveness and efficiency and added incidental information to the consequent event to see if it added to the efficiency of the procedures. The investigators taught four high school aged students with moderate to severe delays to read recipe words. Incidental information added to the consequent event included demonstrating the action that was pictured or demonstrating the use of the object shown to the student. They found that both of the descriptive strategies and the system of least prompts alone (which contained incidental information in the prompt hierarchy) were effective in teaching extra information at above 75% correct responding across all students. Some increases were also seen with the progressive time delay alone, possibly due to generalization effects.

Wolery, Holcombe, Werts, and Cipollone (1991) taught toddlers (aged 2 to 3 years) to recognize rebus symbols for foods using a simultaneous prompting procedure and inserting information that classified the symbols after the correct response. The toddlers learned to recognize the symbols and to classify the foods into breakfast and lunch foods or substances to eat and those to drink.

Wolery, Cybriwsky, Gast, and Boyle-Gast (1991) investigated whether specific attentional responses impacted learning of incidental material. They

taught social studies and health facts to 4 adolescents with learning or behavior disorders. They used a constant time delay procedure in a small group with two attentional responses and two types of feedback for correct responses. They found that general or specific attentional responses did not affect the acquisition of target facts but that more incidental and observational learning was acquired and maintained with a specific attentional response (asking the student to repeat the question).

Edwards (1989) used computer assisted instruction with a constant time delay paradigm to teach four high school students with mild delays to spell abbreviations of words. All four students did learn to spell the abbreviations with a high degree of efficiency. Incidental learning was defined as being able to spell the referent word. Three of the four students learned to spell some of them but the levels of learning were not high. Net gains between 7 and 34% were reported for the three students with an overall net gain of 18.5%. The computer program included a speech synthesizer so the students did not need to look at the referent word.

Werts, Wolery, Holcombe, Vassilaros, and Billings (1991) taught three preschool-aged students with hearing impairments to name shapes and added the names of colors as incidental information. Using a constant time delay procedure with transition based teaching, and minimal instructional time, they found that all students learned the names of the shapes to the criterion level, all generalized the naming of some shapes to other stimuli, and all learned some of the colors. The incidental learning was at a low level (22.2%; range 0% to 50%) overall on the final probes possibly due to the minimal instructional time (under ten minutes total over four months) and the nature of the probe questions calling for generalizations rather than direct recall of trained stimuli.

Wolery, Werts, Holcombe, Billings, and Vassilaros (1991) taught five preschool aged students with language and hearing impairments to recognize coin combinations and inserted two pieces of information in the praise and correction statements. In one condition, the two pieces were seen simultaneously on every trial. In the other,

the students were shown one piece of information on every other trial. Four of the students reached criterion in correct responding on target material and learned some of the incidental material. Learning of the incidental material was again variable across students. The mean correct responding across students for both direct recall of incidental material and stimulus equivalence questions was 63.1%. No difference was found for the method of presentation.

Harrell, Wolery, Ault, Demers, and Smith (1991) taught antonyms to students and added two types on information as a consequence for correct responding. The students saw the written word for the antonym that they learned and heard a verbal definition of the word. The students were later able to read the written word at a high rate, (mean=81.2%). One student was able to state all the definitions, one was able to state the definition of 50% of the words in one of the two sets and the others could not state them.

Gast, Doyle, Wolery, Ault, and Baklarz (1991b) taught students to name photographs of local buildings and places of interest using a constant time delay procedure. They added extra information in the form of addresses and activities that typically occurred in each place. When the students were to learn the address only, all students learned all addresses. When two activities were presented they learned both of these. However, when the activity and the address were presented together, they learned only the activity. The authors postulate that the information that was easier, or of more interest, was the one that the students remembered.

Two studies were initiated in an attempt to find if the incomplete learning of the incidental information would then lead to more rapid complete acquisition of the information. Wolery, Doyle, Ault, Gast, Meyer,and Stinson (1991) added the presentation of the written word for the label of a photograph to the target task of learning to name then. Seven of the eight subjects learned some of the words. In a replication of the study, four students learned to name pictures of fast food restaurants and were shown the written names of the restaurants during the praise statements following the trials. Two of the students learned to read half of the written words and two of them learned

to read all four. Future training then showed that the students were able to acquire the information that they had been exposed with fewer trials to criterion than material they had not seen. Holcombe, Wolery, Werts, and Hrenkevich (1991) taught numeral recognition to preschool-aged students with mild delays. The students were shown the written word for the numeral following correct responses but were given no verbal cues. The students learned to recognize some of the written words. In further training, they acquired the skill of reading the number words they had seen more rapidly than other number words they had not been exposed to.

Table 2

Studies that incorporate incidental learning in the consequent event

Target	Incidental	Presentation	Mean % Acquis	Strategy	Age	Diagnosis	Reference
Sight word	definitions	verbal	78	PTD-group	elementary	moderate mental handicap	Stinson, Gast, Wolery, & Collins (1991)
Sight word	definitions	verbal	18.3	CTD-group	secondary	mild mental handicap	Wise (1990)
Sight word	definitions	verbal	70	PTD-group	elementary	mild	Shelton, Gast, Wolery, & Winterling (1990)
Sight word	definitions	verbal	37.8	CTD-group	elementary	moderate mental handicap	Gast, Wolery, Morris, Doyle, & Meyer (1990)
Sight word/ picture id	signs/picture picture card	modelled	39.1	PTD-group	secondary	severe mental handicap	Carper (1990)
Sight Word	spelling	verbal flash card	87.5	CTD-group	elementary	mild	Gast, Doyle, Wolery, Ault, & Baklarz (1991a)
Sight word (recipe)	demonstration picture	modelled picture card	75	PTD of SLP	secondary	moderate-severe	Gast, Doyle, Wolery, Ault, & Farmer (1991)
Spelling abbreviation	spelling referent word	computer screen	18.5	CTD-CAI	secondary	mild	Edwards (1989)
Labeling	modelling the function	modelled	NA	trial/error	secondary	profound mental handicap	Jansen & Guess (1978)
Social studies	additional facts	verbal	75	CTD-group	secondary	moderate mental handicap	Doyle, Gast, Wolery, Ault, & Farmer (1990)
Social Studies	additional facts	verbal	71-93	CTD-group	secondary	learning/behavior disordered	Wolery, Cybriwsky, Gast, & Boyle-Gast (1991)
Photos of buildings	A. addresses B. activities	verbal	A. 0-100 B. 100	CTD-group	elementary	moderate mental handicap	Gast, Doyle, Wolery, Ault, & Baklarz (1991b)

Table continues

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Table 2 (continued)

Target	Incidental	Presentation	Mean % Acquis	Strategy	Age	Diagnosis	Reference
Rebus symbols	classification	verbal	79	CTD-group	toddler	mild	Wolery, Holcombe, Werts, & Cipolloni (1991)
Shapes	colors	verbal/sign flash card	22.2	CTD-TBT individual	preschool	hearing impaired	Werts, Wolery, Holcombe, Vassilaros, & Billings (1991)
Antonyms	A. word B. definition	flash card verbal	A. 81 B. 36	CTD-group	elementary	learning disabled	Harrell, Wolery, Ault, Demers, & Smith (1991)
Coins	A. word B. pennies	verbal flash card	63.1	CTD-group individual	preschool	language/hearing impaired	Wolery, Werts, Holcombe, Billings, & Vassilaros (1991)
Numerals	word	flash card	NA	CTD-group	preschool	mild	Holcombe, Wolery, Werts, & Hrunkevich (1991)
Labeling photos	word	verbal	NA	CTD-group	preschool	moderate	Wolery, Doyle, Ault, Gast, Meyer, & Stinson (1991)

Note. CTD=constant time delay
PTD=progressive time delay
SLP=system of least prompts
TBT=transition based teaching
CAI=computer aided instruction

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Answers to Self Test

1. Instructive feedback

2. b

3. a. The student does not respond directly to the extra information.
   b. No reinforcement is provided for learning the extra material.

4. Answers may vary.
   The material must be:
   - developmentally appropriate
   - consistent with student's IEP goals.
   - consistent with student's sensory systems
   - discrete rather than chained tasks
   - of an interest to the student.
   - consistent with the curriculum.

5. F

6. F

7. T

8. b

9. Monitoring

10. a. probing
    b. daily monitoring

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